# Success criteria for systems led transformation:

## Managerial implications for global operations management

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**Abstract**

Purpose – Organisational transformation has been a major research theme over the last few decades. The main emphasis focuses on how successful organisations are using information systems and technology (IS/IT) to transform business operations. This paper aims to summarize and evaluate the key perspectives and concepts of change management. These perspectives and concepts are used to conduct an overview of the transformation of a major UK telecommunications company is using IS as a driver.

Design/methodology/approach – This paper focuses on trying to understand the whole range of systems-related problems that may confront an organisation during the introduction of new operational systems as part of organisational change and transformation. The primary objective is to identify best practice. A case study focusing on a large organisation is the approach used to try and elicit learning.

Findings – The view emerging from the case study is that there are generic problems that need to be addressed especially related to how system changes, processes and the customer are managed. Even with an increasing caseload of examples where large firms are unsuccessfully with major organisational transformations-companies are still willing to undergo this risky change process.

Research limitations/implications – It is intended that this best practice framework will be used in other organisational environments.

Originality/value – The paper contributes to widening studies on systems introduction as part of organisational change.

Keywords Operations management, Organizational change, Information systems

Paper type Research paper

### 1. Introduction

Over the last 30 years, information systems and technology (IS/IT) reinforced to an extent by the emergence and embracement of the Web and more flexibility in organisational structures, have been introduced into the operational environment of a significant majority of organisations with various levels of success. The variation in success levels has primarily been as a result of the impact of complex issues, such as what to do with data on legacy systems, data operations, government and industry regulation, competition and regulatory compliance.

IS/IT introduction is about ensuring that new, changed, improved and amended systems and technology that support business operations are successfully brought into an existing live operational environments. Often because of the demanding nature of organisations, it is essential that systems introduction is managed in a manner that brings about minimal disruption to customers or service.

As already stated, organisations have had different levels of success when introducing IS/IT (Maguire and Ojiako, 2007). Generally, this complex process has been underpinned by the use of systems development methodologies, i.e. structured systems analysis and design methodologies; project and programme management methodologies (PRINCE2 and MSP), and in some cases risk management methodologies (i.e. the CCTA's risk analysis management methodology).

It could be argued that these methodologies focus more on trying to control the process rather than contributing to planning for its eventual success. Figure 1 shows that in an ideal situation, these methodologies would be constantly changing to take into account learning from the various IS/IT projects.

The introduction of IS/IT into firms is a very complex process and there are many issues that need to be addressed in advance, during and after implementation. Figure 2 is based on Maguire (2000), shows a range of issues, although not exhaustive that could have an impact on any particular IS/IT introduction.

Usually, when an organisation is considering the introduction of new systems, it is not impossible to consider how factors such as systems architecture (Gulledge, 2008), testing, communications will influence process introduction techniques. As a result of these concerns, in order to enable the realisation of the best outcome possible, it is essential that the process introduction is managed in a way that does not have adverse effects on either organisational operations or the customer experience (Maguire, 2002).

## 2. Why successful systems introduction matters

Generally speaking, the traditional view of business organisations with clearly established boundaries no longer presents a picture of today's business world. This is especially true with the blurring of organisational boundaries and partnerships with clients and competitors becoming more common. All these changes are being influenced by systems and technology.

To be able to support the more dynamic nature of business operations, managers expect systems and technology that are flexible and able to support the enablement of

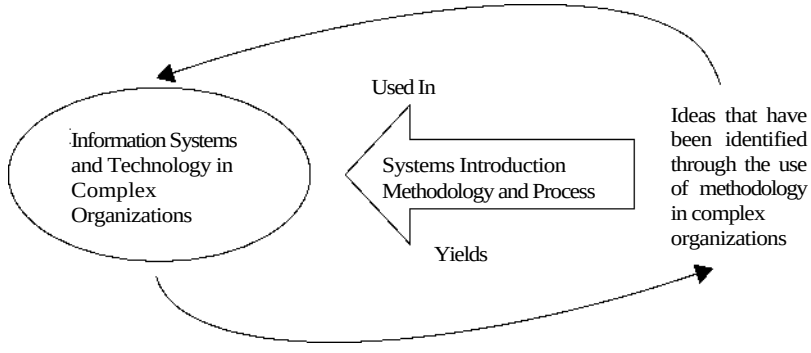



Figure 1. IS/IT introduction framework

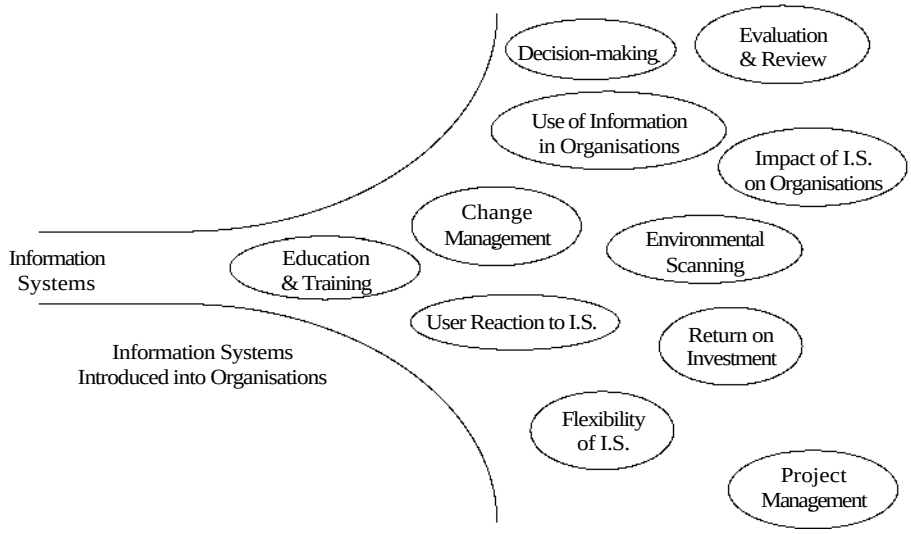



Figure 2. IS/IT resource relationships

business process redesign. Organisations also expect these systems to be able to help support the operations of the organisation, especially as relates to the offering of novel products, incentives and services. This is especially important in the light of a growth in a younger and technologically confident consumer that is increasingly representing a significant percentage of buying power (Ragsdale and Harrington, 2004). In order to meet this challenge, organisations are increasingly ensuring that the following factors are taken into consideration.

2.1 Status of all activities
A common and agreed understanding for the status of all activities, dependencies and risks that could impact on the organisations ability to exploit the introduced systems. This includes actions including reacting to the escalation of faults.

2.2 Planning horizon
A full appreciation of the planning horizon of all systems within the organisation (and their interrelationships). This is especially important as organisations have sought to speed up the time-to-market in the face of increasing competition and rapidly evolving technology. This planning process is important and as we mentioned in the introduction, it may require flexible methodologies to support this process.

2.3 Risk
Risks that could emerge as a result of the introduction of the systems. It is important to appreciate the impact on possible interference with customer operations. At the same time, it has to be appreciated that failure to manage customers successfully during the introduction of systems will almost certainly lead to a loss of business. It is also important to realise that there is always a chance that systems introduction may give customers the idea/opportunity to consider a change of supplier if the introduction is not managed appropriately.

2.4 Interruption of service

During systems introduction, it is always possible that there may be a number of interruptions of service. Again this could lead to a loss of customers if such interruptions are too long. In addition, the internet has dramatically reduced reaction time for consumers. Customer loyalty may be an even more important issue for firms in the future.

2.5 Communications

Excellent communications with customers are essential to ensure that possible changes due to systems introduction are understood and welcomed. It is also essential that any changes to services are explained where changes are likely. It is also imperative that a common communication platform will reduce barriers. Previously, where IS/IT developers have pre-warned users to impending systems changes, they must now embrace customers in the planning process.

**3. Change and transformation**

A feature of today's management literature is the growing emphasis on organisational change, which argues that companies must change in order to survive. Further, there is much evidence (Bresnen et al., 2005), which suggests that a large-scale organisational change stretches management skills and knowledge to the limit and beyond. Popular management literature (Bresnen et al., 2005) shows how managers are being pushed to transform their organisations from bureaucratic, hierarchical structures to flatter, more flexible structures based on project teams. In this new configuration, the argument goes that organisations are better able to keep up the required pace of technological and administrative innovation.

The term change management is a much stressed expression these days which is according to McAllaster (2004), constant and will usually be a normal part of our evolution and essential for survival. The area of change is often seen as a key part of management which has developed its theory over the last 60 years, the majority of organisations still do not use the concept of change to improve their competitiveness, ensure their survival or simply move in a different direction (Mcallaster, 2004). Unfortunately, this is seen to be particularly true especially because strategic change means attempting to change the organisation's culture. Therefore, in order to select the appropriate implementation strategy, the organisation must be able to define its existing and its future culture.

Business transformation involves the bringing of radical changes to organisations by radically changing their structure, processes, attitudes, beliefs and behaviours (Philip and McKeown, 2004). According to McKeown and Philip (2003), it can be seen to encompassing a range of competitive strategies which organisations adopt in order to bring about significant improvements in business performance.

According to Rouse (2005), the main difference between normal change programmes and business transformation is that transformation is not just about change, but fundamental change that substantially alters an organisation's relationships with its key constituencies which includes customers, employees, suppliers and investors. Of particular importance in its effective management and implementation is that transformation programmes do require the staged delivery of business needs (Reynolds, 2007). Key characteristics which concern the different facets

of organisational culture have been identified as characteristics of successful business transformation. These have been identified by Prahalad and Oosterveld (1999) to include factors such as the exploration of new concepts of opportunity.

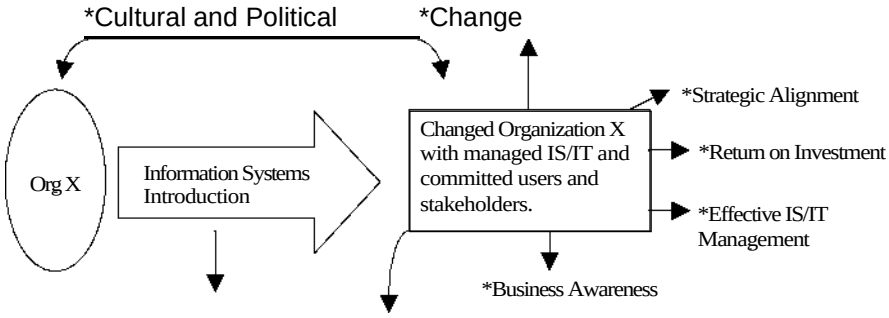
The approaches to change management and other theories of organisational development are intricate and interwoven. They include work carried out by Toffler (1970), who advanced a “future shock” as similar although irreversible to culture shock. While incremental change has the flavour of continuous improvement, discontinuous change, which involves what Toffler refers to as “novelty”, occurs during periods of disequilibrium. Herold et al. (2008), Hage and Mote (2007), Lukas et al. (2007) and Chapman (2002) refer to it as transformational change. The objective of such change is to fundamentally alter an organisation at its core (Newman, 2000), change its essential framework, and ensure a radical shift in operational strategy. As Jarrett (2003), points out, one of the key characteristics of transformational change is that it is constant, infrequent, although rapid and large.

## 4. Transformation and systems

The provision of IS/IT in organisations is always demanding. This is primarily because of drivers influencing both complexity of resource relationships (Figure 2), and the dynamics of a fluid nature of change itself.

If not properly managed, the transformation of an organisation can have a dysfunctional effect on both those working within the organisation (Bennett and Durkin, 2000), and on the organisation’s customers (Goodstein and Butz, 1998), especially as relates to the creation of customer value through contractual obligations, commitments and relationships which exist between the organisation and its customers.

Figure 3 outlines a transformation process covering the introduction of new IS/IT systems and the effect on an organisation. Ideally, when Organisation X goes through




- Systems Methodologies
- User Involvement
- Environmental Scanning
- Systems Education and Training
- Flexibility of Training
- Technology
- Political prioritisation
- Project Management methodologies

Figure 3. Effect of IS/IT introduction on organisations

this process the outcome would be one where committed users are using managed information systems to undertake effective organisational activity.

Systems are often promoted as having major benefits for the organisation and the costs are usually represented as involving hardware, software and staffing costs. However, it should always be remembered that the technical implementation of information technology leads to other change that can have major repercussions on an organisation.

Systems introduction potentially changes the operational practice within organisations. From a transformational perspective, it is however important to recognise that such systems and technology, can in fact become a source of organisational vulnerability (Francis et al., 2003).

Another major issue is the fact that systems (which are often integrated), are being introduced at the same time that staff are trying to cope with other major changes taking place within their organisations. Systems introduction can be resource-intensive and often requires the goodwill of users who give up their time to facilitate the change. At the same time, it can change power structures and interfere with the political status quo. However, the other changes taking place mean that there is less and less time available to give towards system introduction.

Change management is not just an issue with regard to systems introduction. Managers must understand the management of change for any change either inside their organisation or in the environment. Failure by organisations to manage change can have serious consequences for the organisation.

## 5. Research aims and objectives

The interrelationships between various transformational concepts has resulted in an indispensable pre-condition to understand various factors such as strategies, organisational culture, processes and value chains (Francis et al., 2003).

The need to maximise the chances of survival for most organisations have led some companies to employ various strategies. These strategies includes business process re-engineering (Attaran, 2003, 2004), the exploration of offshore opportunities (Farrell, 2005; Jahns et al., 2006; Sako, 2006), business transformation (Keen and Qureshi, 2006) and the restructuring and consolidating of call and data centres (Ellis and Taylor, 2006). It is however important to highlight that while such initiatives are essential, the success of highly distributed businesses ultimately hinges, according to Logan (2004), on the capacity and efficiency of the global networks over which they run, in effect, on the network competency of the organisation (Ritter and Gemu¨nden, 2004; Ritter et al., 2001).

Other factors which need to be explored, include network convergence which although it relies heavily on the underlying technology being failsafe, can lead to additional challenges of assuring the application performance (Kendall, 2004). The operational environment of the organisation, its decision-making structures, the organisation and relationships within and outside an organisation and the systems which supports its operations is crucial to the well-being of any firm in the twenty-first century.

The case study chosen reviews the transformation of a major UK telecommunications operator (BT PLC). At the point of the research methodology being adopted, the lead author was employed by BT PLC.

## 6. Research methodology

Although management research has historically relied heavily on quantitative methods, the important contribution of qualitative methods is well recognised in management research, especially as it employs interpretative, rich narrative descriptions of events (Yin, 2003).

In this situation, we decided that the adoption of the case study approach was most suitable for our research. Primarily, we felt that this was the most appropriate approach as it needed to focus on direct observation of events. We also used additional sources when gathering information which included a review of strategy documents. More importantly, one of the authors had previously been employed as a project manager (for nearly 10 years), working directly on this programme as a delivery manager.

## 7. Transformation and the telecommunications sector

Transformation programmes and initiatives within telecommunications are not new. Fundamentally, they have existed in direct response to technological changes in the industry from mechanical, electronic, digital and IP switching. Numerous studies have been carried out examining how various telecommunications companies have attempted to transform their business. These studies includes work carried out by Erakovic and Wilson (2006) who examined business transformation within New Zealand Telecomms, Ojiako and Maguire (2006) who examined transformation of NITEL, Borsch (2004), who explored transformation within both British Telecom and Deutsche Telekom. Additional transformation programmes driven primarily by the US Telecommunications Act of 1996, the evolution of technology, the rise of the World Wide Web and wireless services have also driven transformation programmes being initiated by companies such as AT&T.

In the UK, British telecommunications PLC (BT) is the company that is the benchmark for the telecommunications industry. It is the largest operator in the telecommunications market (Reynolds, 2005a) and in 2006, BT's turnover was £17.2bn, accounting for 37 per cent of total telecoms turnover in the UK (OFCOM, 2007b). It is also an organisation that throughout its 136 years in operation it has been subjected to change (Florio, 2003). These changes have included structural changes (Lehrer and Darbishire, 2000) and the re-branding of the company which have served as both a response to its transformation from a telecommunications company to one engaged in New Wave technology services (Rufus Leonard, 2007) and its need to adapt to new market requirements. This has been due to environmental and business drivers such as the emergence of IP technology, technical challenges that emerged with the emergence of 3G technology and regulation especially in relation to the recently concluded strategic review of telecommunications emanating from OFCOM which the company adopted in order to avoid a forced de-merger made presented the regulator and other competitors a series of undertakings (OFCOM, 2005a). In effect, providing additional credence to earlier research conducted by Muzellec and Lambkin (2006), who suggest that the decision for most organisations to rebrand is most often provoked by structural changes.

BT as an organisation has extensive local facilities and a surplus of transmission capacities. It is the only telecommunication provider to offer exchange lines across all UK locations (BT, 2003). The company currently controls 70 per cent of exchange line

numbers, which provides it with 53.9 per cent of all call volumes in the UK (OFCOM, 2007a). Along with Broadband and Mobility, Information and Communication Technology is one of the BT Group's key growth areas. From this, the company expects to achieve new revenue growth of at least £1 billion (BT, 2003). The transformation of BT's business since privatisation has been achieved against a background of ever-increasing competition and close regulation. Statistics published by the telecommunications regulator OFCOM show, for example, that call volumes per minute for BT fell from 145,408 to 103,996 (in millions of minutes), between 2005 and 2006. In addition, fixed line call revenues for BT also fell from £949M to £855M between 2005 and 2006 for local UK calls, while international call revenues fell from £324M to £299M between 2005 and 2006 (OFCOM, 2007a). For this reason, it is reasonable to understand why the key strategic challenge for BT has been to generate new business, either through new products and services development or through internationalization (Borsch, 2004).

Transformation has also meant that the organisation has had to radically change its culture from what Lal et al. (2004), describe as passive culture, which was inherited from the UK Civil Service. In recent years, in order to support the adoption of high-performance work practices which are discussed by Ramirez et al. (2007), BT has had to embarked on a number of radical structural changes. For example, it has strived to create a new organisational structure that integrates the design and architecture of its network with its organisational structure by moving away from one which is based on geographic units covering all business units to functional units that occupy a horizontal slice of the network architecture (Reeve, 2001). The company has also embarked on a policy of breaking down the strict specialisation of narrowly defined tasks that characterised its grade structures in the past (Miozzo and Ramirez, 2003), by implementing its NewGRID programme. The objective of the new grading system being to bring about a single and integrated grade structure. The expectation is that this new structure will support BT's new agile practice culture which has been created to underpin its 21st century, outlook.

### 7.1 Programme description

For BT, the delivery of a 21CN (21st Century Network) platform is set to deliver a single IP based multi-service network which replaces the existing plethora of networks, makes clear business sense. The programme which will replace its traditional voice telecommunication portfolio (PSTN), is expected to deliver savings on operational running costs of about £1 billion per annum by 2008/2009 (BT Wholesale, 2006a).

The transformation has also been driven by other factors. For example, the delivery of a single IP based multi-service network according to Philpott (2002), has proved successful in communications companies such as Utfors and Telseon. BT also recognises that its current processes create too many hand-offs, thus not encouraging an end-to-end ownership of the customer experience journey (CEJ). This has led to an uncompetitive customer satisfaction performance, high service delivery costs (the company estimates that 52,000 of its employees are involved in service delivery), and significant challenges managing large solutions. All these factors have considerably driven the need for the organisation to change its cost base and deliver new and innovative products more quickly. This is especially required as challenges to revenues

from its traditional voice telecommunication portfolio (PSTN) are increasing. Statistics provided by OFCOM (2007b), for example show that the company's share of fixed revenues has continuously declined from 71.16 per cent (2002) to 63 per cent (2006). In addition, the organisation recognises that it is only by moving away from its core business of PSTN provision to becoming a leading provider of IT services (as part of a New Wave vision), would guarantee that it is able to remain operating in a very competitive market (Table I).

The conscious decision to implement such a transformation within BT, had not been without concern. Well documented failures to implement such a transformation strategy within telecommunications and the wider area of technology provision do exist. Examples of such telecommunication organisations that have unsuccessfully attempted to implement transformation programmes includes NITEL (Ojiako and Maguire, 2006), the Australian Post Office (Hamilton and Atchison, 1995), and GEC-Marconi which after numerous failed transformations, was finally purchased by Ericsson in 2006.

As part of its vision, BT identified the following objectives of its transformation programme as it seeks to differentiate its capabilities from competitors:

- Enhancement of the customer experience by focusing on customers' needs.
- The provision of cost reductions by rationalising its network as part of an overall network convergence strategy. Such an approach will support a new single IP based multi-service network. As part of this integrated service strategy, the organisation has been discontinuing many legacy networks. This approach will also result in a reduction of operational costs which should reduce prices for customers. It is also expected that this strategy will lead to improvements in customer satisfaction which the organisation currently regards as being at an uncompetitive level.

| Drivers | Measure |
|---|---|
| Network interventions | Too many physical network interventions |
| Platforms | Diverse range of platforms. Each requires different operational models |
| Customer contacts | Majority of customer contacts are reactive |
| Customer entry points | Currently too many entry points for customers leading to inconsistent and conflicting customer experience |
| Customer entry portals | Currently not customer-centric (In effect, can be time consuming and complicated) |
| Computing systems | Current computing systems are too complex. All changes and upgrades involve extremely complex and time consuming processes |
| Processes | Company's processes are mainly manual |
| Data | Organisation is in possession of too much data, but lacks the ability to effectively turn this into useful information |
| Operations | Business operations involves a high proportion of non customer value add work |
| Internal organisational boundaries | Scope boundaries between internal divisions are unclear as relates to data, systems and processes |
| Order management | Order management is too complex and time consuming |

- The provision of a new portfolio of products and services to be delivered via the new converged network. This strategy forms the basis of how the organisation is developing a new product portfolio.
- A reduction in the time to market for new products and services. This is expected to be achieved by creating a group of re-useable common capabilities (Levy, 2005). These are non-hierarchical blocks of functionality which are used to provide a template design for a consistent, intuitive and branded user experience across BT's communications clients and online services (Collingridge et al., 2007).
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- To create re-useable common capabilities, the organisation has set about creating blueprints that detail requirements against desired criteria for each of the key processes.

Overall, BT's transformation programme sets out to achieve annual savings in operational costs by targeting a percentage reduction in current failure costs and where below customer satisfaction, benchmarked against organisations which are regarded to differentiate their capabilities by excellent customer service performance. It is also seeking to achieve the desired savings by increasing automation, encouraging and enhancing customer capability which should lead to increased customer self-service. It also aims to eliminate existing product and inter-organisational boundaries.

## 8. Managerial implications

This section interprets the key findings from the case study against the following four perspectives:

(1) User engagement.

(2) Tests and trials.

(3) Systems.

(4) Product management.

### 8.1 User engagement

The role of user engagement in organisation transformation has long been discussed by researchers such as Harrop et al. (2006) and Crawford et al. (2003). More specific to the engagement of users and employees in organisational change, Axelrod (2003), discussed how organisations can implement change based on essential principles which include widening the circle of involvement. The need for an appreciation of the relationship between users and the organisation within the context of transformation is particularly important taking into consideration research which demonstrates a relationship between major change and employee commitment (Bennett and Durkin, 2000). We note that Rhodes and Nocon (1998), question the role of users in change programmes, especially when in most cases, the roles become avenues for the organisation to legitimatise rather than challenge existing provision. It is however important to note that whatever the debate is relating to the role of users in systems introduction or organisation change, Lettl (2007), sees a direct link between user involvement and radical innovation within organisations.

For BT, ensuring that the organisation is able to deliver radical innovation in terms of product and service provision, but at the same time ensure user satisfaction,

the organisation has sought, in a move welcomed by OFCOM (2005b); consult openly with its customers through its Consult21 process. The Consult21 programme which was set up in 2006 (BT Wholesale, 2006b), has the remit to create, manage and own the framework within which industry and BT can agree on 21CN interoperability, consult on the development of next generation products and services (including access and interconnection products with their associated contracts, timeline, etc.), taking account of OFCOM policy, BT's network capability and industry requirements. Reynolds (2005b), identifies two main phases of the programme. The first is being to work with its wholesale customers in order to identify business process and technical requirements that directly impact on the successful delivery of BT's existing portfolio on to the 21CN platform. For example, as part of this process, consultation on varying areas such as CPE compactability (BT Wholesale, 2006c), systems roadmap covering the and identification of 21CN Systems Architecture and Interfaces Principles (BT Wholesale, 2007a), and Interconnect Route Migration Provision (BT Wholesale, 2007b), have been conducted. Taking feedback from this process, the organisation has gone ahead to review some of its milestone plans and re-plan some deliverables. The second phase of the programme has related to the development of the newer generation products and services, that is the so-called New Wave products and services. This development has also included addressing specific implementation issues such as interconnection and their associated contractual challenges.

8.1.1 User engagement implications. Although the initiative has made significant progress, there is a general acceptance within the industry that there is still much to do. This is especially true since there have been concerns raised within industry by both competitors (MCI, 2005), and the regulators (OFCOM, 2005b), about the effectiveness of the consultation process. For example, while competitors such as MCI (2005), have expressed concerns that the consultation process has become little more than a one-way communications channel for BT, Spectrum Strategy consultants in their report to OFCOM (OFCOM, 2005b), report that concerns raised by competitors also include issues such as a belief that Consult21 has been slow in dealing with many of the issues that matter most to industry participants, such as commercial interconnect arrangements.

## 8.2 Tests and trials

BT's testing and trialling strategy for the new 21CN network involves two major types of test. The core test which is a test the organisation is executing on behalf of all of the Industry, and the Other Licensed Operators (OLOs) test which is the test which the OLOs may or may not wish to execute, over a range of appropriate interfaces on or remote from BT premises. Both types of test are being driven by four distinct factors.

In the first place, there is an appreciation within the company that complexities of integration will occur as a result of the development, deployment and introduction of systems to underpin BT's new single IP based multi-service network.

Secondly, the company, perhaps appreciates that as part of the undertakings made to industry as part of the Telecoms Strategic Review (OFCOM, 2005a), that it is under some obligation to ensure that other licensed operators (OLOs), are able to align their test and trialling schedules to BT's overall test vision in order to ensure that the CEJ continues to be a positive one.

The third point is that BT appreciates the testing of new products and services require a high level of co-ordination among suppliers, OLOs and BT itself. It is interesting how this vision has been implemented, especially with the availability of research (De and Ferratt, 1998), which does demonstrate that it is most likely that problems could occur in terms of agreeing on an overall strategy especially when different interest groups perceive systems-related problems from their own perspectives. BT has a lot of experience in collaborative ventures such as work with Intel (Choong et al., 2007), and HP (Millar and Audisio, 2006). Based on experience gained from such collaborative work, the company recognises that in seeking the input of OLO's in the test strategy, it is unable to design a test programme that necessarily provides a solution that encompasses the specific requirements of every other OLOs. Finally, the company appreciates that such system changes, if not managed appropriately, could have an adverse impact on the CEJ.

8.2.1 Test and trials-implications. In order to manage these three distinct concerns, BT initiated a test programme with four key characteristics.

The first characteristic of BT's test and trialling programme is that it is designed to ensure that the impact of the new systems introduction has minimal negative impact on the CEJ. For this to happen, the overall test strategy is geared on assurance for appropriateness, fitness for purpose, and the provision of enough time to both complete the consultation process and also the test schedule.

The second characteristic of BT's test and trialling programme is that the company has sought to share information relating to its obligatory products and services (such as the 999 service), with industry through the Consult21 forum. The objective is to enable the development of a common understanding of BT's obligatory testing principles. At the same time, the company is initiating an approach which has involved running and sharing a set of standard tests for its obligatory products.

The third characteristic of BT's test and trialling programme relates to core network testing. This is being implemented to ensure that the capability and functionality (both technology and service) of the new single IP based multi-service network is validated. Tests to be carried out include alarms, fault detection, order management (including acknowledgement, set-up, processing, fulfillment and modifications), contingency plans, fault diagnosis and billing. Other testing considerations are required to address specific migration risk relating to the following:

- Service outages as relate to possible breaks in service during the migration.
- The need to possibly freeze customers prior to and after the migration and the impact of this on the overall migration.

The final characteristic of its test and trialling strategy is that it has agreed an appropriate inter-operability testing plan with all OLOs. This aspect of the test and trialling strategy is being managed under the Consult21 Conformance Testing Working Group (BT Wholesale, 2006d). The objective is to ensure that the OLOs are able to interconnect their networks and services which currently interconnect with BT's old with the new single IP based multi-service network. This approach will ensure that a common understanding of the test strategy will be ensured.

8.3 Systems

BT has grown in size throughout its nearly 140 years of operation. As its size has grown, and the variety and types of business operation that the company has become engaged in has also got wider and more diverse, its systems have also grown both in terms of complexity and size. Its current system which has been estimated at between 1,000 (Pyzer et al., 1997; Beal, 2004), and 3,000 separate components (Murray, 2006; Roberts, 2007) is supported by about 15 Network Service Centres, 42 Customer Contact Centres, 26,000 servers, all costing the organisation about £8M per day to operate. An example of the size of the company's systems can be demonstrated by an assessment of BT's CSS system which by 1997 (it became operational in 1989), managed a total of 28 million exchange lines each day (Harrison, 1997). In order to meet its current business challenges, the organisation has had to embark on a programme of work which involves a fundamental change of its current systems architecture which has been in operation since the 1980s.

There is no doubt therefore that the number and size of its systems, in addition to the requirement for manual interventions sometimes required due to the poor integration of systems (Cary et al., 2004; Casati and Shan, 2000), in some cases can lead to a very complex operational environment which can further lead to high operational cost and less than desired CEJ. For example, the provision of new circuits could typically require over a hundred interventions by individuals within the organisation.

As early as 1997, the organisation was aware of the limitations of its systems. For example, research by Furley (1997) and Pyzer et al. (1997), suggest a recognition that the systems served as islands of automation with little integration or flow through of processes. This led to poor customer products and services being developed due to data duplication. At the same time, multiple computing platforms increased the problems of integration leading to uncompetitive implementation and maintenance costs. The architecture had also resulted, according to Reeve et al. (2005), to integration- related problems.

The design of the new single IP based multi-service network is to be based on four principles which Reeve et al. (2005), identified to include the need for all services to move to IP technology, the convergence of fixed and mobile network architectures, the increasing use of middleware (Beddus et al., 2007), and the development of one-touch support systems. In doing so, Choong et al. (2007), points out that 21CN will deliver support for multiple access technologies and the added intelligence to support seamless handover across heterogeneous networks. According to Dames (2007), this focus on network convergence, is regarded by Brown et al. (2005), as the starting point for network evolution, leading to cost savings over traditional voice, and probably explains why the rate of adoption is set to increase by 2008 with roughly 74 per cent of large enterprises expecting to fully migrate their voice networks to IP based platforms.

In order to support the delivery of the new single IP based multi-service network, BT needs to implement substantial systems changes. These changes will result in the reduction of BT's systems to about a hundred (from its current number which we have earlier estimated to be between 1,000 and 3,000). Overall, the company believes that this approach should reduce time-to-market timescales (in line with the 90-day delivery cycle to be discussed in the conclusion). This delivers not only real-time organisational performance (Malhotra, 2005; Lindorff, 2002; Lindquist, 2003), but also meets the demands of customers who are now demanding readily available and customised

technology-based products and services (and their supporting processes), to be delivered in near real time (Levenburg and Klein, 2006).

Questions still remain on how these interventions contribute to the overall CEJ, especially as OFCOM (2007b) is reporting that operators have focused strongly on customer retention over the last 18 months by increasing both bundled offers and migrating to longer contracts. It is however important to highlight that research by Harris Interactive (2005), appears to suggest that overall, a high proportion of BT's customers appear very or extremely satisfied with the organisation, in all cases more so than its competitors.

8.3.1 Systems implications. As part of the organisation's consultation process, numerous exercises and workshops have been held to debate possible principles that will be adopted by the company as it strives to introduce a new single IP based multi-service network. Principles that have emerged from the consultation process include an agreement between BT and the OLO's that the new systems to underpin 21CN will be designed with both a focus on developing systems that can be applicable to a range of solutions without being product specific. In addition, it is desired that the new single IP based multi-service network will be based on a system that is built with technology, delivery process and data parameters that can be shared (BT Wholesale, 2005).

### 8.4 Product management

Recognising that in today's competitive markets it is crucial to have winning products (Ebert, 2007), BT has gone about establishing a product roadmap encompassing product launch, change, withdraw and support strategies that defines the organisational and system capabilities that will support its 21CN product portfolio.

The organisation has attempted to address product transformational requirements within certain limitations. For example, it considers its traditional organisation structure as a major limiting factor to the development of a viable product management strategy. The reason being that different divisional and operational units developed and implemented varying product strategies without due consideration to the impact of the overall business. In effect, there was no top-level strategic view of product sets meaning that in effect, no one had an overall inventory of all products. The effect was that the product delivery was slow, fragmented, divergent and uncoordinated leading to an inefficient and complex product development approach. The rapidly expanding systems also had implications for product and pricing data accuracy as product testing now involved a time consuming (and costly), process of re-entry of data onto individual test systems before re-keying onto live systems. The overall impact again was that products became relatively expensive to develop, deliver and manage. All these have had financial, reputation and satisfaction impacts on BT's customers.

8.4.1 Product management implications. These issues point to the need for BT focus on new strategies that will encompass issues surrounding organisational change. These will be reviewed in the conclusion section.

## 9. Discussions

With the need to deliver the new IP Network, there is now a realisation that the days of a simple product development strategy are now long gone. The challenge now is for the

following strategies to be implemented. In the first place is the creation of a single product dataset with associated configuration management process. This will enable the company to manage data though their lifecycles. Secondly, the organisation needs a single product strategy which is supported by common processes and capabilities which we have earlier discussed within the context of a consistent, intuitive and branded user experience. The final approach involves the major policy of reducing the number of systems within the organisation's portfolio by adopting a smaller and more flexible systems architecture which will supports its products. It is assumed that this will drive the need to change, withdraw and upgrade its current product portfolio.

BT recognises that the delivery of the new single IP based multi-service network is one of the most complex and challenging change management initiatives the company has embarked on. In order to ensure the successful implementation of this change, the company has embraced fully the principles put forward on the management of change in organisations which have been discussed by numerous scholars (Pellegrinelli et al., 2006; Pellegrinelli, 2002; Pellegrinelli, 1997; Pellegrinelli and Bowman, 1994; Gaddie, 2003; Partington, 2000). This is especially important as earlier work by Boddy and Macbeth (2000) puts forward the grim message that projects intended to implement significant changes in the way an organisation works seldom turn out as expected.

The stakes for BT are quite high. The company in attempting to create savings of £1 billion per annum by 2008/2009 on operational running cost (BT Wholesale, 2006a). In addition, with earlier mentioned challenges on fixed line call revenues and also on its traditional core business, the organisation is attempting to implement a transformation programme with the added challenge of ensuring that its customers are not impacted negatively by the changes.

The organisation recognises that failure in managing the identified constraints will create significant threats for its future business, so it started creating a programme team to ensure the successful planning, deployment and introduction of the new single IP based multi-service network (and associated underpinning systems). Its role is being to manage the entire programme management process from conception to implementation. This will cover all products, services and management processes and the programme team's role is to create and manage the high level framework for the programme.

In order to introduce the required technology that will enable the transformation of the organisation, the organisation has adopted a delivery approach which is based on 90-day cycles. The principle is to delivery specific requirements using fast, creative and flexible methods in an approach popularised by the Agile Software development approach (Aydin et al., 2005; Kurian, 2006; Nerur, 2007) and adopted by various communications companies such as Sabre, Sprint, Nortel, Symantec, Fidelity, Borland and Qwest (Holler, 2006). This is against the introduction of newer systems every three to five years. The idea is that with increased use of project implementation reviews (PIR's; also called "hothouses") within this 90-day period, the organisation is able to respond very quickly to lessons learnt from the PIR.

## 10. Managerial implications for global operations management

Research relating to management-of-change issues has identified the potential gains to organisations of linking business with IS/IT strategies. Failure to plan at this strategic level may lead to organisations failing to benefit and create value for customers

through the introduction of new systems, although at the very least IS/IT should underpin the organisation's business strategy.

We generally accept that the technology-dominated hard systems approaches to IS introduction would be effective in relatively static environments, we recognise that many systems projects would be successful if the environment for which they had been developed had not changed over time. However, virtually all organisations find themselves in competitive environments, driven by changes in the market.

This has been starkly identified with the recent changeover within Terminal 5 at Heathrow Airport, London. The various repercussions of this apparent "failure" have been played out in the glare of the global media and this will have major policy implications for many organisations.

A poor change management strategy will have brand implications that may last for decades. In this particular example Heathrow Airport, BAA, British Airways, and several other carriers are implicated in this debacle. This type of situation is even more serious when it is in an area of business where customers can easily transfer their loyalty allegiances to different operators.

Undertaking internal change and failing can have serious implications for an organisation rolling out a major change programme that has an immediate deleterious effect on customers can have catastrophic knock-on effects for short, medium, and even long-term profitability. Firms should adapt their change management policy with IS/IT projects to reflect the wider implications of this particular type of change.

The technology is in fact only one segment of the change process. Companies should be aware of the organisational, user, customer, process, political, cultural, risk management, resistance to change, project management and change management issues that will have an effect on any changeover. This is not an exhaustive list but it identifies a number of key areas where failure could have negative repercussions for the organisation.

It is crucial that organisations undertaking change in this domain spend more time planning the process than they do developing the product. The changeover period is resource-intensive and planning for implementation is a critical stage of that process.

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